The Case for an Airmobile, Amphibious Scout Vehicle

by Stanley C. Crist

In the the January-February 1999 *ARMOR*, Dr. Asher H. Sharoni and Lawrence D. Bacon described a conceptual Future Scout and Cavalry System (FSCS) that is a masterpiece of advanced technology. Except for the fact that the commander and gunner are located in the hull, the Sharoni/Bacon FSCS has a basically conventional configuration that is approximately as long and wide as an M2A2 Bradley, and weighs 15-20 tons. To enable the scout vehicle to move rapidly about the battlefield, a hydropneumatic suspension and a hybrid power system would allow cross-country speeds in excess of 60 miles per hour!

Designing a better suspension and increasing the power-to-weight ratio is the usual method for improving mobility. This approach is somewhat lacking, however, as the increased speed capability would soon be matched by other armored vehicles. What is needed is a way to achieve a mobility differential that won't be negated by improved suspensions, whether on our own tanks or our enemy's. Like the horse cavalry in relation to the foot soldier, the FSCS should be capable of a speed differential on the order of *four to one* — or even greater! It was just such a mobility differential that enabled Brigadier General John Buford's 1st Cavalry Division to take possession of the high ground at Gettysburg before the slower Confederate infantry could.

The trouble is, there is a practical upper limit to how fast a tracked vehicle can be driven off road, and — except for flat, desert areas like those of Southwest Asia — that limit is far below 60 miles per hour. In forests, mountains, jungles, and urban terrain, the maximum speed attainable by a ground-hugging FSCS may be no faster than that of a horse.

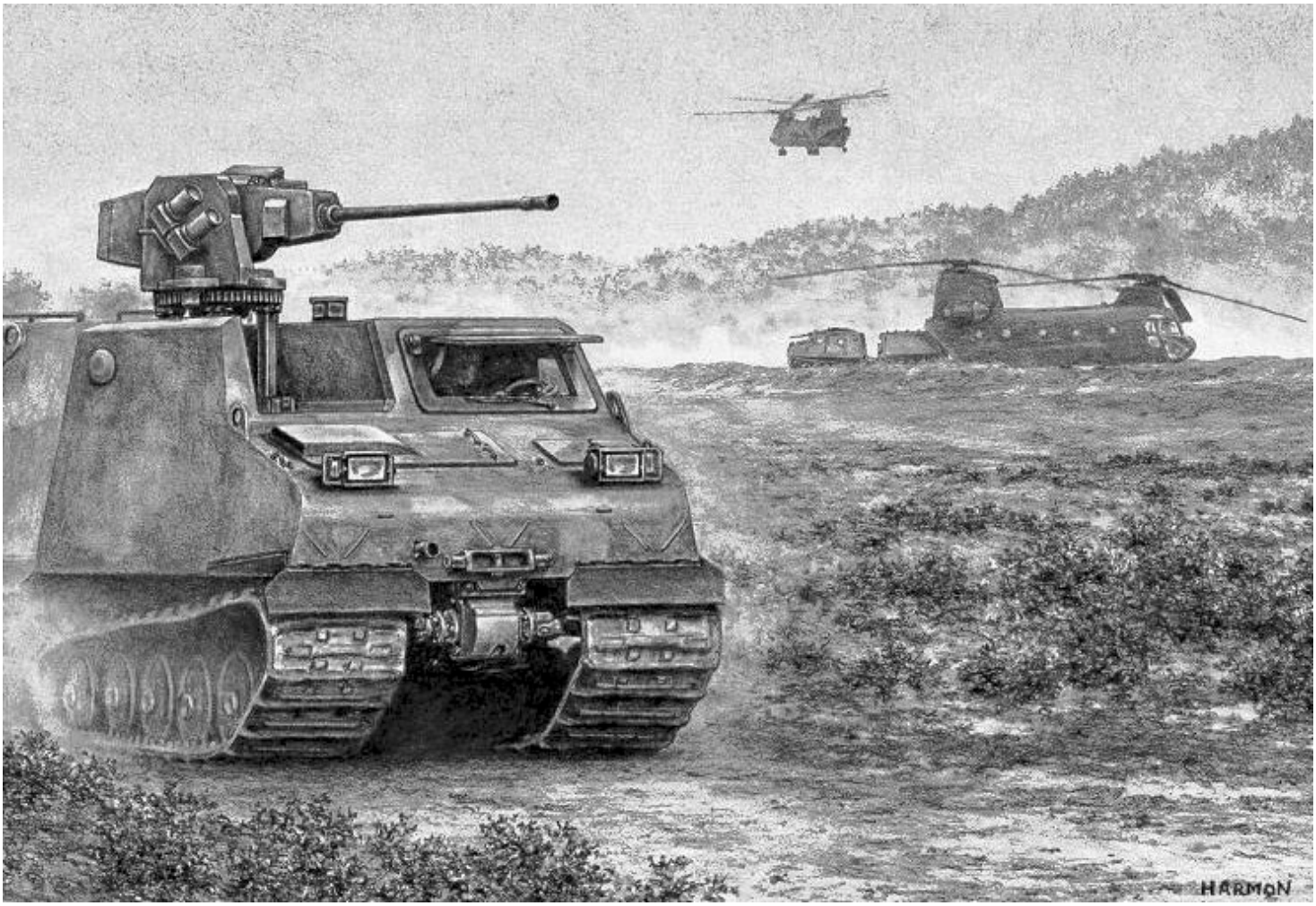
It should be obvious that the only way the FSCS can have a four-to-one speed differential is if it can fly. This is not to advocate the substitution of helicopters for the FSCS, even though they have been successfully employed for scouting for many years. However, the helicopter's superior mobility would prove invaluable to an FSCS. If the scout vehicle were of a size and weight that permitted it to be transported in the cargo bay of a standard CH-47D, it would be able to move around the battlefield at speeds greater than *140 miles per hour!*

Helicopter transport of scout vehicles is not a new concept. Scout HMMWVs and Marine Corps LAV-25s are often carried by helicopters as underslung loads, but rigging (and derigging) a vehicle for sling carry takes time, and exposes the personnel, rotorcraft, and vehicle to a number of hazards. These dangers could be minimized if the scout vehicle were to be capable of *internal* transport by a cargo helicopter. Unfortunately, the HMMWV is a little too wide to fit into a CH-47, while the other scout vehicle currently in use — the M3 Bradley — is much too big and heavy even for sling carry.

One full-tracked, armored vehicle that can be transported in the Chinook's cargo bay is the Wiesel weapon carrier. In 1994, the German army formed an airmobile, light armor battalion that is equipped with TOW and 20mm autocannon variants of the Wiesel. This unit is primarily employed for overwatch missions, counterattacks, and blocking actions, but it can also be used to perform reconnaisance. The Wiesel is likely very well suited to those roles, but it lacks the internal space needed to hold four scouts and their equipment. The manufacturer has developed a longer and taller version, however, that might prove usable in the scout role. Unfortunately, the increased height of the "stretched" variant dictates that its weapon would have to be removed in order for the vehicle to fit in a CH-47.

Also, none of the Wiesels are capable of swimming, which definitely limits their potential as a scout vehicle. One of the FSCS requirements is for a *mobility differential* relative to both the supported force and enemy units. Accomplishing this demands not only high speed, but also the ability to swim *without preparation.* This characteristic was not incorporated into the Sharoni/Bacon FSCS concept, and at a combat weight of 40,000 pounds, it seems unlikely that a vehicle of the proposed configuration could swim without the aid of a flotation screen — a device that is time-consuming to erect, exposes the crew to possible enemy fire during the assembly procedure, and is too vulnerable to damage during combat operations.

In the brief history of mechanized warfare, the combat use of flotation screens by tanks and infantry vehicles has been relatively rare, and has too often resulted in sunken vehicles and drowned crewmen. Because of these factors, the world's armies continue to depend on bridges, ferries, and fords to enable their armored forces to cross water obstacles. A scout vehicle that could — without preparation — swim across bodies of water would have a distinct advantage over an opposing force that lacked that capability. It could, for instance, use a water obstacle as an aid in breaking contact with a non-swimming opponent. Also, the scout vehicle commander would be able to choose almost any point on a river at which to cross, instead of being forced to cross at locations that are sure to be in the enemy's gunsights.



There is only one tracked, armored vehicle available that has extremely good mobility on all types of terrain, can swim well without preparation, has ample room for a crew of four and a full complement of surveillance equipment, and yet is small enough that it can fit inside of a CH-47. That is the Swedish Bv206S, a variant of the M973 SUSV currently in service with some units of the U.S. Army.

In its present form, the Bv206S could undoubtedly be an excellent scout vehicle, having mobility far superior to both the HMMWV and the M3A2. It is not perfect, though. The armor protection is only comparable to that of the M1114 HMMWV (7.62mm AP and 155mm HE airburst), well below what would be desired. As with the HMMWV, crew vision is provided by windows; such large, flat, glass surfaces tend to be highly reflective, and can produce a visual signature that can be easily seen at long distances.

The Bv206S, like the M973 SUSV, is an articulated vehicle; in essence, it is two tracked vehicles that are mechanically connected. It seems that articulation is necessary for a vehicle that is narrow enough to fit into a CH-47, yet has the requisite mobility and agility. A vehicle with a width of 6.5 feet can be no more than about 13 feet in length, due to technical limitations of tracked vehicles design. A conventional vehicle of these dimensions would be subject to violent pitching when crossing rough terrain at high speed, making it impossible to keep pace with fast-moving tanks and infantry carriers.

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Articulation effectively solves the mobility problem inherent to a narrow vehicle, but it causes complications in providing for armament and crew positioning. The Bv206S has a weapon configuration identical to that of the scout HMMWV: a machine gun mounted on the roof of the front vehicle. Not only are these weapons less capable than most scouts would prefer, but it appears that the weapon must be dismounted from the Bv206S in order for the vehicle to have enough vertical clearance when entering or leaving the CH-47. This means that the scouts would be unable to defend against attack while waiting to board the helicopter, and just after offloading.

It does not seem possible to fix these deficiencies without a complete redesign of the vehicle, in order to incorporate a more potent, turret-mounted weapon system. There are three options: install the turret on the front vehicle, the rear vehicle, or both. None of these choices is entirely satisfactory. Putting a two-man turret on the lead vehicle would make it difficult to create room for the driver, and the field of fire over the rear arc would be obstructed at times by the trailing vehicle. Placing the turret on the rear vehicle would greatly reduce the space available for surveillance equipment, and the field of fire over the front arc would be obstructed at times even by a low-profile front vehicle.

The third alternative is to put a small, one-man turret on both vehicles, so that targets can be engaged at all times, no matter how the front and rear vehicles are oriented.

Self-defense capability of the Bv206S could be substantially upgraded by utilizing the Javelin missile system. Preferably, the Javelin would be on a vehicle mount (similar to what M113 armored personnel carriers in Germany used to have for the Dragon antitank missile), but it could also be fired in hand-held mode by a soldier standing in an open roof hatch.

Due to the above-mentioned characteristics, it is rather unlikely that either the Wiesel or the Bv206S will be FSCS candidates. They do, however, have many desirable and outstanding features that should definitely be incorporated into a state-of-the-art scout vehicle. Whatever configuration is eventually selected for the Future Scout and Cavalry System, for maximum mobility it must be able to swim and to fly!

The German Army uses Wiesel armored weapon carriers, which are helicopter-deployable, as the core of a light armored battalion. They can be armed with 20mm autocannons or TOW missile launchers. The limited internal space, however, rules them out as carriers of a four-man scout team with its equipment, and Wiesels are not amphibious. – MAK Photo

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Stanley Crist is a former scout section leader, having served with the 3rd Battalion, 185th Armor. He has previously been published in *ARMOR* and other defense-related publications.

Scout Vehicle Specifications

General	M1114	Wiesel 2	Bv206S	M3A2
Length, overall (inches)	190.5	148.8	270.0	258.0
Width, overall (inches)	86.0	71.7	78.8	129.0
Height, overall (inches)	74.0	87.7	74.8	117.0
Ground clearance (inches)	15.3	11.9	13.8	18.0
Weight, combat loaded (lbs)	12,100	7,900	15,400	60,000
Performance				
Speed (on pavement)	70 mph	45 mph	31 mph	38 mph
Speed (in water)	----	----	2.9 mph	4.0 mph
Cruising range	275 miles	370 miles	230 miles	250 miles
Grade	60 %	60 %	100 %	60 %
Side slope	40 %	30 %	57 %	40 %
Vertical wall climbing	N/A	16 inches	24 inches	36 inches
Trench crossing	Nil	59 inches	67 inches	100 inches
Internal transport by CH-47D?	No	Yes	Yes	No
Swim without preparation?	Non-swimmer	Non-swimmer	Yes	No